(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 137 188 A3

(12) EUROPEAN PATENT APPLICATION

(88) Date of publication A3:
13.08.2003 Bulletin 2003/33

(43) Date of publication A2:
26.09.2001 Bulletin 2001/39

(21) Application number: **01302073.0**

(22) Date of filing: **07.03.2001**

(51) Int Cl.[7]: **H03L 7/08**, H03L 7/07, H03L 7/081, G09G 3/20

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **24.03.2000 US 534932**

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(54) Digital phase lock loop

(57) A system includes an all digital circuit implementation and standard cell construction of PLL (108) with a digital frequency synthesizer and a digital phase detector (224). The synthesizer includes a digital DLL (202) including a plurality of delay chains, each including at least one digitally programmable delay element to achieve a phase lock with an input reference signal. The synthesizer also comprises a non-glitching MUX (206) electrically coupled to the digital DLL (202) for selecting a tap output from one of the delay elements to select at least one pulse glitch-free from the selected output tap, and a phase accumulator (208) electrically coupled to the MUX (206) for precisely dividing a timing period of the input reference signal and selecting a tap output from one delay element to select at least one pulse at a precise point in the timing period from the output tap. The phase detector (224), is electrically coupled to the synthesizer to compare an edge of the input reference signal to an edge of a synthesized signal to provide information representing a phase error between the edge of the input reference signal and the edge of the synthesized signal.

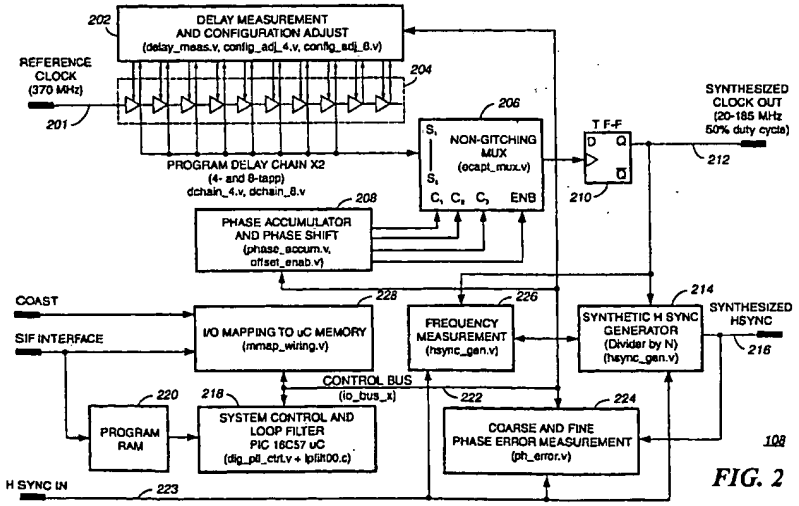

FIG. 2

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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 2073

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X Y	WO 99 67882 A (XILINX INC) 29 December 1999 (1999-12-29) * page 8, line 20 - page 17, line 25; figures 3,7,8 *	1,2,4-10 3,11	H03L7/08 H03L7/07 H03L7/081 G09G3/20
Y	US 5 841 430 A (KURIKKO JARMO) 24 November 1998 (1998-11-24) * the whole document *	3,11	
A	WO 00 14879 A (GOSSMANN TIMO ;GOETZ EDMUND (DE); SIEMENS AG (DE)) 16 March 2000 (2000-03-16) * the whole document *		
A	US 6 002 279 A (NAVIASKY ERIC ET AL) 14 December 1999 (1999-12-14) * the whole document *		

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

H03L
G09G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
MUNICH	10 June 2003	Kahn, K-D

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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10-06-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9967882 A	29-12-1999	US 6289068 B1	11-09-2001
		EP 1004168 A1	31-05-2000
		JP 2002519883 T	02-07-2002
		WO 9967882 A1	29-12-1999
		US 2001033630 A1	25-10-2001
US 5841430 A	24-11-1998	FI 920416 A	31-07-1993
		DE 4390256 T0	20-07-1995
		WO 9315497 A1	05-08-1993
		GB 2278525 A ,B	30-11-1994
		JP 7503327 T	06-04-1995
WO 0014879 A	16-03-2000	DE 19840241 C1	23-03-2000
		WO 0014879 A2	16-03-2000
		EP 1145437 A2	17-10-2001
		JP 2003515963 T	07-05-2003
		US 2001036240 A1	01-11-2001
US 6002279 A	14-12-1999	AU 1112599 A	17-05-1999
		WO 9922482 A1	06-05-1999

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82